tied as to suggest such a designation. The choking or drying of the cocoons was in colonial days a part of silk-raising, and not of silk-reeling; and, while reeling-establishments may undertake to choke the cocoons brought in by the raisers in their immediate neighborhood or by agents, the marketing of fresh cocoons must necessarily be limited in time and distance. They cannot bear pressure without injury, and all baled cocoons must needs be choked. One is hardly justified in comparing the methods of colonial times with those in vogue to-day in France, where modern steam filatures and railroads have produced such profound modifications. We cannot see how choked cocoons, which have but one-third to one-fourth the weight of fresh cocoons, can be marketed at the same rates as the fresh cocoons. The term 'green' cocoons is often used in English as the equivalent of fresh cocoons; but, as quoted in the French markets of to-day, the word 'green' (*vert*) refers to those of a green or greenish color. Perhaps this may explain the puzzle. C. V. RILEY.

Thermometer exposure.

In No. 58 of *Science*, Professor Mendenhall calls attention to interesting differences of the minima temperatures on cold, still nights of the winter. I agree with him that a difference of exposure, and proximity to buildings, may explain a difference in reading; but it is impossible to explain by them alone the enormous difference noticed in Columbus (27.3° F.). There must have been, besides, one or another of the following conditions, probably both. When the conditions are favorable to radiation, and the night is still, the lowest strata of the air are mostly cooled by contact with the cold, upper surface of the ground; and more so if there is snow, and a so-called inversion of temperature is produced. The temperature rises from the lowest strata to a certain height. Examples of this can be found in the observations at Pulkova, near St. Petersburg. A thermometer placed at the height of seventy-eight feet was almost constantly higher than one at six feet above ground at eight P.M. In August, on clear days, the mean difference was 2.1° F., and once in September it was 5.2° F. In the months from December to March, when the ground is covered with snow, even at one P.M. the upper thermometer was higher than the lower; the mean difference on clear days of December and January at one P.M. amounting to 1.3° F., and once it amounted to 4.1° F.

The same results were obtained by experiments made at Kew, by direction of the meteorological office. The minima were lower at a height of twenty-one feet above ground than at a hundred and twenty feet; and on one occasion, at nine P.M., during a fog, the latter was higher by 10.8° F. than the former.

Now, most of the signal-service stations must have comparatively high minima, not only because they are mostly located in the interior of cities, but because the thermometers are often placed very high above the ground, at the level of the fifth or sixth story of city buildings. Probably the stations of the Ohio state service are placed lower.

Besides the height of thermometers above the ground, what I call the 'topographical conditions' are of importance. At an equal distance from the level of the ground, under conditions favorable to radiation, there will be much lower minima in valleys than on hills. This is caused by the descent of the coldest and heaviest air to the valley, and also by the fact that in a valley the air is in the vicinity of a greater surface of the ground. During the anticyclone of Dec. 19–30, 1879, the summit of Mont Verdun, near Lyons, France, had a mean temperature of —1.7° C.; and the Parc de la Tête d'Or, in the city, situated four hundred and fifty metres lower, a mean of —7.1° C. The mean minima differed by more than 12°C. Very likely the observations of the state service at Columbus were made on lower ground than those of the signal-service. Where anticyclones in winter are common in high latitudes, with the ground covered with snow, the mean temperatures of the winter months must be considerably colder in valleys than on the surrounding hills and mountain slopes, as the insolation during the day interferes but slightly, and not at all during some days at points beyond the polar circles, with the equilibrium of air strata obtained during the night.

This cold of the nights in valleys, subjecting plants to freezing on nights when those that grow on hills are spared, is well known. Perhaps it is less noticed in the United States, as there low temperatures are oftener accompanied by high winds than in Europe. The olive-cultivators in southern France, and the coffee-growers in the hilly districts of the province of San Paulo, southern Brazil, know this so well that they do not plant their trees in valleys, from fear of frosts. A. WOEIKOF.

St. Petersburg.

Dalmanites in the lower carboniferous rocks.

During a recent geological excursion near this city, one of our party, Mr. Henry Lane, found and pointed out to me a trilobite, which I extracted from the stone myself. The rock on which we were working was the upper part of the Cuyahoga shale of the Waverly group of Ohio, now universally, I believe, referred to the lower carboniferous system. The only genus hitherto reported from these rocks in America is Phillipsia, with the exception of two species of Proetus scarcely distinguishable from Phillipsia. The specimen in question, however, distinctly differs from both of these in the pygidium, the only part yet obtained. Instead of the evenly rounded and margined tail of those genera, it shows the flabellate and fimbriate form of Dalmanites. The occurrence of this genus or of this type of trilobite, so high in the geological series, is both surprising and 'uncanonical.'

E. W. CLAYPOLE.

Buchtel college, Akron, O.,
April 14.

'A curious optical phenomenon.'

Except in one curious point, 'F. J. S.'s' latest experiment (*Science*, No. 63, p. 475) obviously accords with my note (same page). Apparently, the virtual image is three feet *in front* of him, or nine feet from the wires, since the phantom rises when he bows; the slats are seventeen and two-thirds times wider apart than the wires, from centre to centre; and every fourth wire hides every third slat, while the next wire but one hides a slat-shadow. But how can thirty slats and their shadows thus give *twelve* dark phantom lines? With his telescope, 'F. J. S.' may find that two of them, least perfect, are where wires cross the *frame* of the blind.

Two words of mine, three lines from the bottom of the page, require correction. The size of the image is not 'very nearly' as described, but *exactly* so. If this image could become an actual screen, then *its* image, in turn, would be the farther screen; and any line through a wire-crossing in either of the three screens would meet the other two at points *quasi*-homologous to each other.

JAMES EDWARD OLIVER.

Cornell university, April 29.